

**ABSTRACT****Fence-Free Etching of an Iridium Barrier Having a Steep Taper Angle**

5           An Iridium barrier layer is between a contact plug and a bottom electrode  
of a capacitor. Etching is performed to pattern the bottom electrode and barrier  
layer using a fluorine-based recipe resulting in the formation of a first fence  
clinging to the sidewalls. Next the remaining barrier layer is etched using a CO-  
based recipe. A second fence is formed clinging to and structurally supported  
10 by the first fence. At the same time, the CO-based recipe etches away a  
substantial portion of the first fence to remove the structural support provided to  
the second fence. The second fence is therefore lifted-off from the sidewalls  
leaving the sidewalls substantially free of clinging fences. The etched barrier  
layer has a sidewall transition. The sidewalls have a relatively low taper angle  
15 above the sidewall transition and a relatively steep taper angle below the  
sidewall transition.

Fig. 6